IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventors:	Joachim LOHR, et al.	Art Unit 2416
Appln. No.:	10/586,736	Exr. C. Patel
Filed:	July 21, 2006	Conf. No. 5985
For:	METHOD OF HARQ RETRANSMISSION TIMING CONTROL	

RESPONSE UNDER 37 CFR 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated February 25, 2009, the Applicants respectfully request reconsideration and allowance of this application in light of the following remarks.

Claims 24-40 stand rejected, under 35 USC §103(a), as being unpatentable over Hwang et al. (US 2002/0168945) in view of Ha et al. (US 7,099,273). The Applicants respectfully traverse these rejections based on the points set forth below.

Claim 24 defines a method for controlling uplink data transmissions in which a UMTS Node B transmits a feedback message to a user equipment and the received feedback message triggers a synchronous retransmission of a retransmission data packet from the user equipment.

The Office Action acknowledges that Hwang does not disclose synchronous retransmission of data (see Office Action page 3, second paragraph). To overcome this deficiency, the Office Action proposes that Ha discloses synchronous retransmission (see page 3, second sentence of last paragraph).

As stated in Applicants' specification, a UMTS synchronous retransmission protocol is one in which a receiving device identifies a retransmission message based on the time it is received (see specification page 11, lines 13-14 and 24-25, and page 12, lines 9-10). (It should be noted that references herein to the specification and drawings are for illustrative purposes only and are not intended to limit the scope of the invention to the referenced embodiments.) In relation to claim 24, the recited synchronous retransmission of a data packet from a user equipment to a node B indicates that both the user equipment and the node B have a common timing reference that supports communicating the data packet at a time the node B will recognize as a time for receiving a retransmission data packet.

Ha does not disclose that a transmitting device and a receiving device have a common timing reference for indicating whether a data packet received by the receiving device is a retransmission data packet. Instead, Ha discloses that the transmitting device dynamically adjusts a period between a previous transmission and a subsequent transmission, which may be new data or retransmission data, so as to transmit data only when bandwidth is expected to be available (see Ha col. 16, lines 34-42). Ha provides no indication that the receiving device knows the dynamically adjusted period or may use the dynamically adjusted period to distinguish between new transmission data and retransmission data.

Accordingly, the Applicants submit that the teachings of Hwang and Ha, considered individually or in combination, do not render obvious the subject matter defined by independent claim 24. Independent claims 28, 32, and 36 similarly recite the above-mentioned subject matter distinguishing method claim 24 from the applied references, although claims 28 and 36 do so

with respect to apparatuses. Therefore, allowance of claims 24, 28, 32, and 36 and all claims dependent therefrom is deemed to be warranted.

To promote a better understanding of patentable distinctions of the present claimed subject matter over the applied references, the Applicants provide the following additional remarks.

Ha relates to an improved data transport and management mechanism within a network communication system (see Ha abstract; col. 1, lines 16-19; and col. 3, lines 31-33).

More specifically, Ha discloses an improved congestion control mechanism for TCP, since the conventional (conservative) congestion control mechanism implemented in TCP tends to erroneously assume that random packet loss within wireless networking environments, such as GPRS (see Ha col. 6, lines 14-17), corresponds to congestion loss, rather than to a mere temporary degradation in the signal quality of a wireless channel. This erroneous detection of congestion loss may cause a server to substantially reduce the size of a congestion window and a corresponding number of unacknowledged packets the server may transmit to the client according to the conventional TCP congestion control mechanism. The error recovery mechanisms of TCP are also considered susceptible to signal handoffs and deep fades in that the unacknowledged packets may cause an exponential increase in the retransmit timer and a corresponding decrease in the data throughput, which in many cases may represent overly aggressive responses to the actual problems. Furthermore, if multiple connections are established between a client and the server, the aggressive initialization typically employed within TCP implementation during slow start may cause new connections to substantially interfere with existing connections (see col. 7, lines 20-51).

In view of these shortcomings in conventional TCP implementations, Ha suggests two basic mechanisms for improved congestion control. In the first implementation, a transmit timer is utilized — instead of the acknowledgement-based flow control typically implemented within TCP architectures — that enables timer-based flow control of data transmitted by the server. Instead of transmitting a specified number packets in response to receiving a specified number of acknowledgements, the server transmits a packet (a new packet or a retransmitted packet) in response to each expiration of the transmit timer. The period of the timer can be determined by the ratio of the smoothed round trip time and the smoothed congestion window and may be periodically updated as a predetermined number of new measurements are taken. This timer-based flow control and the smoothing used to compute the period of the transmit timer may reduce bursty transmissions and provide a better measurement of network congestion (see Ha col. 7, line 52, through col. 8, line 6; col. 12, line 41 et seq. related to Fig. 6a, especially col. 15, line 63, through col. 16, line 48).

Another implementation suggested in Ha reduces the adverse effects associated with random packet loss by resetting the congestion window in response to a second packet loss (rather than the first) to provide improved robustness to random packet loss. Additionally, the initialization criterion used to determine whether to transition from aggressive growth of the congestion window in TCP slow start mode to less aggressive growth in congestion avoidance can be based on the smoothed round trip time (instead of the size of the congestion window) in order to provide a better estimation of network congestion. For multiple connections between the same client and the same server, the congestion windows and initialization criteria for all

active connections may be linked together and allocated among the active connections so as to avoid destructive competition among existing connections (see Ha col. 8, lines 7-24).

As to the relevance of Ha's disclosure to the present claimed subject matter, the Office Action proposes that Ha discloses the features of independent claim 24 not disclosed by Hwang (see Office Action page 3, first full paragraph).

As stated by Applicants in their Amendment dated December 23, 2008, the claimed synchronous retransmission relates to a UMTS-specific mechanism that allows a user equipment (UE) to autonomously (without related control signaling) retransmit individual PDUs using HARQ relative to a common timing reference.

In this connection, Applicants note that the timing of the retransmissions in the improved TCP protocol implementation of Ha may be controlled by a timer, i.e., a timing reference. However, this is not a common timing reference in the sense of the timing of the retransmission being known to both the UE (transmitter) and a Node B (receiver) so as to enable the Node B to receive the retransmission on the appropriate radio resource.

Ha's TCP data packets are transmitted using an IP protocol (see Ha col. 6, lines 42-61 and Fig. 1) on a connectionless, best effort basis. Accordingly, Ha's TCP protocol does not require or foresee that the exact transmission timing of packets retransmitted by TCP is known to the receiver, as other lower layer mechanisms of the transport network are supposed to ensure the correct reception of data according to the OSI reference model.

Similarly, the "scheduling" of transmissions in the improved TCP protocol of Ha (if one can speak of scheduling) is not controlled by the data receiver (client), but is protocol inherent to the TCP implementation in the transmitter (server) alone. As proposed by Ha, in relation to Fig.

6a, the server transmits a packet (a new packet or a retransmitted packet) in response to each expiration of the transmit timer. The period of the timer can be determined by the ratio of the smoothed round trip time and the smoothed congestion window and may be periodically updated as a predetermined number of new measurements are taken (see Ha col. 7, lines 63-67; col. 12, line 60, through col. 13, line 3; col. 15, line 65, through col. 16, line 5; and col. 16, lines 11-22). As Ha explicitly states (see col. 16, lines 34-44), the data including retransmitted data is transmitted based on an anticipated bandwidth, and not on a scheduled, i.e., allocated bandwidth (resource) as implied by the claimed invention, reciting:

> *the common control message restricts the Transmission Format Combination Subset (TFCS) of each of the plurality of user equipments to thereby set a maximum uplink resource common to the plurality of user equipments that each of the plurality of user equipments is allowed to utilize for uplink transmissions on the uplink data channel.*

Further, as also apparent from the explanations above, the "synchronization of the transmit and retransmit processes," disclosed by Ha in column 16, lines 34-44, does not mean a synchronization of the transmission timing of retransmissions (as implicit to the term synchronous retransmission) but only means synchronizing the transmission window employed by TCP to control the sequence number range of packets that are currently transmitted.

Similarly, there is also no common control message suggested in Ha. As explained above, the improved "rate control" of the TCP protocol disclosed by Ha does also not require any such signaling message. Rather the transmit timer is set according to the ratio of the smoothed round trip time and the smoothed congestion window which are both parameters individual to the respective transmitter (server).

Accordingly, there is no control of "each of the plurality of user equipments to thereby set a maximum uplink resource common to the plurality of user equipments", nor is there any message that "restricts the Transmission Format Combination Subset (TFCS)" of plural UEs simultaneously to a common maximum uplink resource, as recited in claim 24.

Thus, Ha is not related to the features distinguishing the claimed invention from Hwang and the claimed invention is not rendered obvious by a combination of Hwang and Ha.

In view of the above, it is submitted that this application is in condition for allowance, and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

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